UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/826,443	04/04/2001	Eric John Hewitt	AHA-02201	6524

28960　　　7590　　　02/26/2004		EXAMINER	
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ART UNIT	PAPER NUMBER
2133	13

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DATE MAILED: 02/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
	09/826,443	HEWITT ET AL.
Office Action Summary	Examiner	Art Unit
	Esaw T Abraham	2133

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>*04 April 2001*</u>.
2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-21* is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *2-21* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All   b)☐ Some * c)☐ None of:
      1.☐ Certified copies of the priority documents have been received.
      2.☐ Certified copies of the priority documents have been received in Application No. _____.
      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>*4,5,7,8 and 10-12*</u>.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1.   Claims **2 to 21** are presented for examination.

****** The examiner considers the preliminary amendment filled on 1/23/02.

Priority

2.   Acknowledgment is made of applicant's claim for domestic priority under 35 U.S.C. 119 (e)

(provisional patent application serial number 60/194570) filed on 04/04/00.

Information Disclosure Statement

3.   The examiner has been considered the references listed in the information disclosure

statement (see attached PTO-1449).

Claim objections

4.   Claims **16, 18 and 19** are objected to because of the following informalities:

Reference characters corresponding to elements recited in the detailed description and the

drawings may be used in conjunction with the recitation of the same element or group of

elements in the claims. The reference characters, however, should be enclosed within

parentheses so as to avoid confusion with other numbers or characters, which may appear in the

claims. The use of reference characters is to be considered as having no effect on the scope of the

claims. Therefore the examiner would like to suggest to the applicant to remove the parentheses

from the claims.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5.   Claim **15** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite in that it

fails to point out what is included and excluded by the claim language with the use of the phrase:

"**a signal to ratio may be**" (see claim 15 line 2). This claim is an omnibus type claim.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6.   Claims **2 to 15,** are rejected under 35 U.S.C. 101 because the claimed invention are

directed to algorithm not embedded in computer readable medium. For example, the steps of

receiving an input signal and approximating a Log-likelihood-ratio result (as in claim 1); the

steps of receiving an input signal, approximating a Log-likelihood-ratio result, determining a

slope for the actual Log-likelihood-ratio value and quantizing the slope (as in claim 10); the steps

of receiving an input signal, approximating a Log-likelihood-ratio result, calculating and

separating an actual Log-likelihood-ratio value, determining a constant a partial derivative,

calculating a slope using a linear equation and quantizing the constant using the quantizing

equation (as in claim 15) are only directed to mathematical algorithms rather than limited to

practical applications.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section
102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject
matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to
which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459

(1966), that are applied for establishing a background for determining obviousness under 35

U.S.C. 103(a) are summarized as follows:

1.   Determining the scope and contents of the prior art.
2.   Ascertaining the differences between the prior art and the claims at issue.
3.   Resolving the level of ordinary skill in the pertinent art.
4.   Considering objective evidence present in the application indicating obviousness
     or nonobviousness.

7.   Claims **16-21** are rejected under 35 U.S.C. 103(a) as being unpatentable over

Sindhushayana (PN: 6,594,318).

As per claims **16 and 21,** Sindhushayana teaches a technique for computing soft-

decision input metrics to a turbo decoder and a method of approximating log-likelihood ratio

metrics for a plurality of turbo encoded symbols, the plurality of turbo encoded symbol having

been modulated with quadrature amplitude modulation (QAM) signal constellations having

gray code labeling, is provided and further the method includes the steps of extracting a

complex-valued modulation symbol soft decision on a modulation symbol, whereby the

complex-valued modulation symbol soft decision having an in-phase component (I) and a

quadrature component (Q); scaling the complex-valued modulation symbol soft decision to

obtain a log-likelihood ratio metric for a most-significant code symbol of the modulation

symbol (see figure 8 elements 406, 410, 412, 414 and col. 3, lines 27-48). Further,

Sindhushayanate in figure 2 disclose a receiver (40) includes a demodulator (44) coupled to an

automatic gain control (AGC) (46) that is coupled to a converter (ADC) (48) whereby the

output of the ADC represents digital samples provided to LLR computation circuit (see col. 10,

lines 22-33) **Not explicitly disclosed** converting module for converting the LLR result of (I, Q)

symbols into unsigned values. **However,** Sindhushayanate teach a common scale, referred to as

log-likelihood ratio (LLR) probabilities, represents each bit by an integer in some range, e.g., [-

32,31] and a value of 31 (unsigned or positive) signifies a zero with very high probability and a

value of -32 signifies a one with very high probability (see col. 2, lines 37-45). **Therefore,** it

would have been obvious to a person having an ordinary skill in the art at the time the invention

was made to represent the converted LLR result as signed or unsigned values since assigning as

signed or unassigned is conventional and well known. **This modification** would have been

obvious because a person having ordinary skill in the art would have been motivated to simplify

the decoding configuration and maximize the decoding efficiency.

As per claim **17,** Sindhushayana teaches all the subject matter claimed in claim 16

including Sindhushayanate in figure 2 disclose a receiver (40) includes a demodulator (44)

coupled to an automatic gain control (module) (AGC) (46) that is coupled to a converter (ADC)

(48) whereby the output of the ADC coupled to an input of a first receiver multiplier (50) to

LLR computation circuit (see col. 10, lines 22-33)

As per claim **18,** Sindhushayana teaches all the subject matter claimed in claim 16

including LLR computation for PSK constellations is performed and each modulation symbol

represents a particular string of code symbol values, defined by its labeling (see col. 23, lines 34-40).

As per claims **19 and 20,** Sindhushayana teaches all the subject matter claimed in claim 16 including Sindhushayana teaches a technique for computing soft-decision input metrics to a turbo decoder and a method of approximating log-likelihood ratio metrics for a plurality of turbo encoded symbols, the plurality of turbo encoded symbol having been modulated with quadrature amplitude modulation (QAM) signal constellations having gray code labeling, is provided and further the method includes the steps of extracting a complex-valued modulation symbol soft decision on a modulation symbol, whereby the complex-valued modulation symbol soft decision having an in-phase component (I) and a quadrature component (Q); scaling the complex-valued modulation symbol soft decision to obtain a log-likelihood ratio metric for a most-significant code symbol of the modulation symbol (see figure 8 elements 406, 410, 412, 414 and col. 3, lines 27-48). Further. Sindhushayanate teach that an estimates of the LLR metrics obtained in association with generalized square QAM and M-ary PSK modulation schemes including, e.g., 64QAM, 256QAM, and 16PSK (see abstract).

Conclusion

8.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US PN: 5,657,354   Thesling et al.

9.   Any inquiry concerning this communication or earlier communication from the examiner

should be directed to Esaw Abraham whose telephone number is (703) 305-7743. The examiner

can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are successful, the examiner's supervisor,

Albert DeCady can be reached on (703) 305-9595. The fax phone numbers for the organization

where this application or proceeding is assigned are (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the receptionist whose telephone number is (703) 305-3900.

Esaw Abraham

Esaw Abraham

Art unit: 2133

Albert DeCady
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